

Claims

1, A Footwear inner liner comprising:

- an upper portion (Fig 1, a) with an opening through which a foot can be inserted and accommodates a wearer's ankle or leg (Fig 1 c) and a lower portion the sole (Fig 1 b), the upper and lower portions form a sock-like envelope with a closed end to accommodate a wearer's toes,
- comprised of a layered fabric composite material that is permeable to gases and impermeable to water the envelope is constructed from a plurality of joined parts where tape is bonded over joints waterproofing the joint,
- bonded to the said lower portion of the envelopes outer surface is a resilient elastomeric material providing waterproofing over that which it encompasses,
- the elastomeric material is formed to a pre-determined shape;

characterised in that:

- the said elastomeric material is padding,
- the said padding extends around the sides of the inner liner and is formed and bonded three dimensionally to the said envelope in an ergonomically considered shape,
- the periphery of the said padding material is reduced in thickness and consolidated and densified around the sides of the inner liner
- the said padding comprises a consolidated and densified durable skin on its outer surface,
- the said padding comprises selectively consolidated and densified locations forming defined shaping of the padding.

- 2, A footwear liner as claimed in claim 1, wherein the said padding has a selectively controlled internal cellular structure,
- 3, A footwear liner as claimed in claims 1 or claim 2, wherein the said padding is perforated in defined locations (Fig 4, g) and the holes create routes permitting gases but not water to pass between the inside of footwear liner to the inside of the outer footwear.
- 4, A footwear liner as claimed in claims 1, 2 or 3, wherein between the padding and the sole of the bootie envelope intermediate materials and structures are optionally positioned and bonded.
- 5, A footwear liner as claimed in claim 4, wherein the intermediate component is configured with holes that are aligned in a corresponding spatial relationship to the holes in the padding and are configured to permit the flow of gases (Fig 4, h).
- 6, A footwear liner as claimed in claims 3 to 5, wherein the periphery of the holes or perforations are securely bonded and sealed to the envelope.
- 7, A footwear liner as claimed in claim 1, wherein the padding comprises solid or a cellular material.
- 8, A footwear liner as claimed in claim 2, wherein the padding comprises a cellular material with a closed cell structure.
- 9, A footwear liner as claimed in claims 3 to 6, wherein the intermediate materials and structures can comprise felts, open or closed cell materials waffle structures, gels, bladders, bellows and the like.

- 10, A footwear liner as claimed in any preceding claims, wherein the padding is a durable polymer such as EVA, EVA copolymers, TPU's, TPE's, TPR's, TPV's, EPDM's, vulcanising rubbers, thermoset elastomer polymers or other materials with similar resilient and flexible properties.
- 11, A method for making a footwear inner liner which comprises:
an upper portion (Fig 1, a) with an opening through which a foot can be inserted and accommodates a wearer's ankle or leg (Fig1 c) and a lower portion the sole (Fig 1 b), the upper and lower portions form a sock-like envelope with a closed end to accommodate a wearer's toes, comprised of a layered fabric composite material that is permeable to gases and impermeable to water the envelope is constructed from a plurality of joined parts where tape is bonded over joints waterproofing the joint, bonded to the said lower portion of the envelopes outer surface is a resilient elastomeric material providing waterproofing over that which it encompasses this is formed to a pre-determined shape, the said elastomeric material is padding, the said padding extends around the sides of the inner liner and is formed and bonded three dimensionally to the said envelope in an ergonomically considered shape, the periphery of the said padding material is reduced in thickness and consolidated and densified around the sides of the inner liner
the said padding comprises a consolidated and densified durable skin on its outer surface, the said padding comprises selectively consolidated and densified locations forming defined shaping of the padding.
- 12, A method for making a footwear inner liner as claimed in claim 11, wherein the padding is bonded using a heat activating adhesive.
- 13, A method for making a footwear inner liner as claimed in claims 11 and 12, wherein the padding is three-dimensionally formed and bonded simultaneously to the sock-like envelope using a heat resistant elastic membrane to exert controlled pressure and transfer controlled heat to the padding and envelope.
- 14, A method for making a footwear inner liner as claimed in any of the claims 11 to 13 , wherein the inner liner components are collated and assembled and supported upon and over a last that can be heated and cooled in a controlled manner.
- 15, A method for making a footwear inner liner as claimed in any of the claims 11 to 14, comprising a process of effecting selected consolidation and densification of the padding by positioning a substantially planar, but three dimensional, support or pressure mask onto the outer surface of the padding to selectively reduce and selectively increase the pressure exerted upon the padding in predetermined areas in repeatable manner.
- 16, A method for making a footwear inner liner as claimed in claim 15, whereby the elastic membrane is compresses the assembly the last and the membrane are heated between 80 oC and 250 oC and then cooled to a temperature where the then assembled footwear liner is stable.

- 17, A method for making a footwear inner liner as claimed in any of the claims 11 to 16, whereby an assembly comprising of the pre-assembled envelope securely placed over the last, the optional intermediate materials and the padding positioned over and onto the envelope supported by the last a pressure mask is placed upon the outer surface of the padding and when the assembly is inside a vessel or chamber (Fig5,h,g) and a heat resistant elastic membrane (Fig5,e Fig6,e Fig7,i, Fig10,i) such as silicone or similar is placed over the assembly and then sealed by the outer edge (Fig5,d) of the chamber, pressure is then exerted onto the assembly by the membrane and the assembly of the footwear liner components are supported by the last by being positioned on and over the last, the pressure is applied by creating an unequal pressure on one side of the membrane compared to the opposing side this is achieved by means of fluids or gases supplied into a chamber or evacuated from a chamber or both by external means both the last and the elastic membrane are heated and cooled during the process, such a device is commonly known as a heated membrane press.
- 18, A method for making a footwear inner liner as claimed in any of the claims 11 to 17, whereby the padding is shaped in a primary forming process prior to it's placement upon the envelope.
- 19, A method for making a footwear inner liner as claimed in any of the claims 11 to 19, whereby the pressure mask serves to selectively reduce or selectively increase the pressure exerted by the elastic membrane upon the assembly of components.
- 20, A method for making a footwear inner liner as claimed in any of the claims 11 to 19, whereby the assembly of components to be bonded and formed are held securely in an intimate relationship and in an evacuated atmospheric environment or partial vacuum, minimising air entrapment between the bonded components, creating good adhesion and decreasing the possibility of water permeability of joints encompassed by the padding.